

light, we are told, produces first stimulation and then depression, neurasthenia and even loss of memory. To protect us from these terrible ills we require a skin so highly pigmented that the sun's rays cannot influence our delicate nervous organisation. The want of a sufficiency of pigment in the skin, Dr. Woodruff informs us, has played an important part in the history of the world. The decline and fall of the Roman Empire and the decay of Greece were, in his opinion, due to the fact that the military forces of these powers were largely recruited from the northern blonde races. These dominating blondes, bred under cloudy skies, were reduced to impotence because their skins were insufficiently pigmented to resist the baleful influence of the bright sun of the Mediterranean. Light, and not luxury, was responsible. It is not surprising to learn that the conduct of the schoolboys of New York is worse on a bright June day than on a cloudy day in winter, but we should have thought that the author's reminiscences of his own school days would have suggested that there were other more probable causes than the irritating effect of the chemical rays of light upon the schoolboy's nervous system.

It is difficult to criticise an author who, in considering the experimental work of Ferni, whose opinion differs from his own, says, "it seems certain that he has been misquoted, and that the fact is the reverse of what he is alleged to have said." It is surely usual in a scientific treatise to verify references, but here, as elsewhere, Dr. Woodruff appears to have been rather hurried.

While admiring the author's industry and his courage in advancing his contentions, we cannot but consider many of his conclusions unwarranted. With the remark that it is a pity that our slum babies cannot undergo such "torture," we cannot forbear quoting the following statement of Dr. Woodruff:—

"We moderns of the intelligent classes alone violate the mother's instinct to hide away in the dark with her baby, and we ruthlessly thrust it out into the sun's rays, actually strapping the poor little sufferers into their carriages and torturing them with the direct rays of the sun pouring down into their faces."

OUR BOOK SHELF.

Handbuch der Heidekultur. By Dr. P. Graebner. Pp. viii+296. (Leipzig: W. Engelmann, 1904.) Price 9s. net.

THE German word "heide," like the English "heath," is applied to very different types of vegetation. In the narrowest acceptance it signifies a district covered with dwarf shrubs where ling or heather predominates, and such a formation is not uncommonly associated with loose, sandy soil. But in north Germany "heide" implies a wood, usually a pine wood, and the same conception attaches to it in other parts of Germany, as, for instance, the Dresdener Heide. Heath is therefore not a formation according to the ecological use of the word, but is applied to land where certain physical conditions prevail, and covers not only stretches of open woodland, but also grass and other moors, and may even be extended to peats and bogs. One feature common to these different formations is the presence of humus, and this is included in the definition given by Ramann.

The suggestive views as to the formation of heaths

advanced by Dr. Graebner in 1901 have become widely known, and have received very general acceptance. Heaths or moors may develop on sands or under water, but in north Germany, at any rate, and not improbably in other countries, much of the heathland has taken the place of forests. Opinions differ as to the causes which have brought about the change. Borggreve and Krause have attributed the disappearance of forests to destruction by animals, but Graebner attaches more importance to continual draining of salts into the lower layers by percolating water. Another factor, which has not been sufficiently emphasised by Graebner, is the action of those bacteria which give rise to humus in the absence of air. Want of air no less than impoverishment of the soil plays its part.

Although the book is written for the practical man, Dr. Graebner has included a certain amount of purely scientific matter where it has a bearing on economic problems, but the chapter written by Mr. O. von Benthem is more especially concerned with practical considerations. It is evident that profitable cultivation of heath land requires not only careful and scientific farming, but in some cases success can only be attained by general cooperation of the farmers either as a society or under Government supervision. The preparation of the land for agricultural farming or for tree planting is discussed in detail; as a preliminary deep ploughing is advisable and quite necessary where moor-pan has formed. Moor-pan (Ortstein) is practically a layer of stone, which is formed when percolating water containing humates reaches layers of soil which are rich in mineral salts; the humates are precipitated, and bind the particles of soil into a stratum of stone, which as it thickens cannot be penetrated even by tree roots.

In the latter portion of the book the different formations are considered from the purely botanical standpoint according to the characteristic plants. The problems connected with the cultivation of heaths are complicated but interesting; for this reason the opinions of Dr. Graebner, who has made a careful study of the subject, are the more valuable.

I Nuovi Indirizzi e le Promesse della Odierna Antropologia. By Fabio Frassetto. Pp. 71. (Castello: C. E. S. Lapi, 1905.) Price 3 lire.

THIS little work consists of a series of four lectures which the author delivered as an introduction to his course of anthropology in the 1904-5 session of the University of Bologna, where, after a break of twenty years, he has taken up the work begun by Sergi before his removal to Rome. Appropriately enough, the first lecture of the four deals with Sergi and his principles of skull classification, and sketches very briefly the types and the deductions which Sergi draws from them—Eurasian and Eurafrican forms, and five species of pygmies—at the same time pointing out that many of these views are only provisional. Dr. Frassetto holds that just criteria of race are of the utmost importance, not only for the sociologist, which most inquirers would be prepared to admit, but also for the medical man, who will more readily diagnose the maladies which he has to treat, in proportion as racial morphology and pathology are determined with precision and at the same time it becomes possible to classify the individual patient from an anthropological point of view. If he is too sanguine in this, another point on which Dr. Frassetto insists does not seem beyond the range of practical politics; this is the development of pædagogic anthropology, which shall regulate the education of the individual child by scientific principles. Even here, however, at any rate in our own case, the problem of feeding the child and of providing it with a healthy body will probably

occupy the first place for some time to come, so far as elementary education is concerned.

The second lecture deals with the work of Maggi and the morphology of the cranial bones. This is a subject on which Dr. Frassetto has himself published some valuable studies. He would have done well to indicate in his lecture that some, at any rate, of the new views on the number of centres of ossification are based on what seems to be an unduly small collection of cases. The third lecture treats of de Giovanni and his work in clinical anthropology, which deals with a patient according to his morphological characteristics rather than as an individual. Finally, we have a sketch of the work of Lombroso on criminality and genius. Dr. Frassetto insists on the need for scientific treatment of criminals, especially those of the habitual class.

It goes without saying that in brief studies of this sort we only find the broad outlines, without qualification or hint of difficulties, and herein lies perhaps a certain danger for the unfledged anthropologist who attends the academic courses. The book is, however, readable, and offers an example to English anthropologists who wish to interest a larger public.

N. W. T.

Catalogue of the Lepidoptera Phalaenae in the British Museum. Vol. v. *Catalogue of the Noctuidæ in the Collection of the British Museum.* By Sir George F. Hampson, Bart. Pp. xvi+634; pls. lxxviii-xcv. (London: Printed by Order of the Trustees, 1905.)

WE congratulate the authorities of the British Museum and the indefatigable author on the steady progress of this important work, of which a fresh volume appears, with almost clockwork regularity, every two years. The present volume is the second devoted to the Noctuidæ, and contains the second subfamily, the Hadeninæ. These are much less showy moths than those dealt with in the first three volumes of the series, and are more subdued in their colouring; but they are perhaps more interesting to British entomologists, for the family is fairly well represented in the northern hemisphere, although in a work devoted to the moths of the whole world, British, or indeed European, species are few and far between. The work is profusely illustrated, the descriptions are full but not too lengthy, and short notices of larvæ, where known (some of which are here published for the first time), have been included. The keys to the genera and the tables of species will also be found very useful by working entomologists. A table of the phylogeny of the 78 genera into which the author divides the Hadeninæ is given on p. 2, but without comment, which we think is wise, for such tables, in the present state of our knowledge, can only be tentative; and comments on the supposed affinities of genera have often a tendency to become too dogmatic.

Synonymy cannot, of course, be given in full in a work of this character, but in the case of European species, which are most burdened with it, the necessity for further details is largely obviated by a reference to Staudinger's last catalogue; still, we think that, in the case of the few British species, Barrett's "*Lepidoptera of the British Islands*" might have been referred to.

We heartily commend this important book to the working entomologists of all countries. Five volumes have already appeared, but if it is ever completed it will certainly far exceed in bulk the twenty-seven volumes of the "*British Museum Catalogue of Birds*." Hitherto it has been wholly the work of one man, and we hope that when he finally lays down his pen, a very large proportion of the gigantic task of describing the moths of the world will have been accomplished by his hands.

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LETTERS TO THE EDITOR.

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The Spinthariscopes and Retinal Excitability.

I HAVE recently been making a series of observations upon retinal excitability, and have used, among other test stimuli, the well known flashing scintillations of a pocket spinthariscopes. The special value of the instrument in this connection is the subminimal or minimal intensity of the retinal excitation judged by the disappearance or appearance of visual sensation. The method used by physiologists for ascertaining whether any given condition alters the excitability of a tissue is that of stimulating periodically the tissue by subminimal or minimal exciting agencies under constant conditions and then changing one of these conditions; if, as the result of such change, the subminimal or inadequate stimulus becomes adequate, the excitability of the tissue has been raised by the change; if, on the other hand, the minimal or adequate stimulus becomes inadequate, then the excitability of the tissue has been lowered by the change.

It is well known that with the ordinary pocket spinthariscopes no luminous effects are seen unless the eye has been rendered sufficiently sensitive by some minutes' darkness; this is especially the case during the daytime, the effects at night being almost instantaneously visible. The stimulation of the retina by the scintillating flashes is thus of the minimal order, and becomes subminimal when the eye is exposed to daylight.

It is thus possible to place the eye under different conditions, and to determine by means of the visibility of the flashes in the spinthariscopes whether the retinal excitability has been raised or lowered; the method has the merit of great simplicity, all that is necessary being to go into a dark room and immediately look through the instrument; the time necessary for the appearance of the first visible luminosity and for the full appearance of the flashes is longer the lower the general excitability of the retina.

A further point of physiological interest is brought out by simple experiments along these lines. It is well known that when the eyes at night look at groups of stars, faint groups not in the direct line of vision are distinctly seen which disappear when the gaze is directed towards them. There is an accumulating mass of evidence that this familiar experience is the sensory aspect of a modified condition of the retina, the modification consisting in an augmented excitability of the peripheral portions of the retina. It appears probable that such peripheral augmented excitability is localised particularly in the outer segments of one set of retinal elements, the rods, which contain the visual purple discovered by Kühne. The rods are extremely numerous in the peripheral region, and constitute the sole elements in nocturnal birds such as the owl. The visual purple of the rods is blanched by light, especially by the more actinic rays, but the blanching disappears with darkness, and this re-constitution of the substance is associated with the presence of the choroidal pigment. There is thus an adaptation process which renders the dark-adapted eye more excitable than it otherwise would be, and this augmented excitability is especially prominent in that part of the retina which contains large quantities of rods, viz. the peripheral portions. The specialised elements of the central part of the retina (macula lutea) consist in man almost entirely of cones; it is undoubted that in daylight this part is the most excitable region, and that it possesses to a remarkable degree the capacity of localised response, thus enabling two sources of light to be discriminated as distinct when so near together that they subtend an extremely small angle. At night, or with the dark-adapted eye, the whole condition is modified, and the peripheral part of the retina has its excitability augmented more than the central part, so that sources of light of subminimal intensity for the latter are adequate to excite the former; these facts are readily demonstrable by means of the spinthariscopes.

Thus if in the day time the observer takes the spin-